

In the Specification:

Please amend the title as follows:

[[A]] Method of Manufacturing [[an]] ~~a Electronic Device~~ MEMS device and ~~Electronic Device~~
MEMS device

Please add the following heading, on page 1, after the title and before the paragraph shown below:

TECHNICAL FIELD

[0001] This invention relates to a method of manufacturing an electronic device comprising a micro-electromechanical systems (MEMS) element which comprises a first and a second electrode, which second electrode is movable towards and from the first electrode, which method comprises the steps of:

Please add the following heading, on page 1, line 18, before the paragraph as shown below:

BACKGROUND

[0007] Microelectromechanical systems (MEMS) refer to a collection of micro-sensors and actuators, which can react to an environmental change under micro-circuit control. The integration of MEMS into traditional radio frequency (RF) circuits has resulted in systems with superior performance levels and lower manufacturing costs. The incorporation of MEMS based fabrication technologies into micro and millimeter wave systems offers viable routes to devices with MEMS actuators, antennas, switches and capacitors. The resultant systems operate with an increased bandwidth and increased radiation efficiency, reduced power consumption, and have

considerable scope for implementation within the expanding area of wireless personal communication devices.

On page 4, line 1, please add the following heading before the paragraph shown below and amend the paragraph shown below as follows:

SUMMARY

[0018] It is ~~therefor~~ therefore an object of the invention to provide a method of the kind mentioned in the opening paragraph, in which the sacrificial layer can be removed only locally.

Please add the following heading, on page 8, line 10, before the paragraph as shown below:

BRIEF DESCRIPTION OF DRAWINGS

[0040] An embodiment of the present invention will now be described by way of example only and with reference to the accompanying drawings, in which:

Please add the following heading, on page 8, line 27, before the paragraph as shown below:

DETAILED DESCRIPTION

[0047] In MEMS fabrication, surface micro-machining is often used for making free-standing structures on top of, for example, silicon substrates. The general process flow for surface micro-machining is illustrated in Figure 1 of the drawings. As shown, a base layer 10 and a mechanical layer 12, of Al, Cu, Ni or an alloy thereof are deposited on a substrate 14 with a sacrificial layer 16 between them. The sacrificial layer 16 is then removed by means of etching leaving the base layer 10 in the form of free-standing, freely moveable structures.

Please amend the paragraph below, on page 10, starting at line 7, as follows:

[0053] Referring to Fig. 3 a stage in the manufacturing of the device of the invention is shown. In this stage the etch-stop layer 18, the base layer 10, the sacrificial layer 16 and the mechanical layer 12 have been applied. In addition, as compared to the embodiment of Fig. 2, there is an intermediate metal layer 11, and a second sacrificial layer 17. Windows in the sacrificial layers 16 and 17 have been made only after the provision of this second sacrificial layer. This is effected with reactive ion etching. The metal layers 10,11 have acted as etch-stop layers, that at one stage the mechanical layer 12 is connected to the intermediate metal layer 11, whereas at another stage it is connected to the base layer 10. A mask 20 is applied on top of the mechanical layer 12. This mask 20 includes a window 21 to the sacrificial layer 17. Use is made of a polyimide with a thickness of about 5 µm. This is suitable in view of the thickness of the mechanical layer 12, for instance 1 µm, and offers sufficient protection against the fluorine plasma. Hereafter, the sacrificial layers 16,17 are locally etched, so as to create an air gap ~~the air-gap~~ 26. The mask 20 is not removed but constitutes part of the beam structure of the MEMS element. In addition, it may act as a passivation layer for other elements in the device. The mask 20 may further be used to provide further metal layers according to a desired pattern that can be used as contact pads, and as sealing ring for an hermetic package. Use is made herein of electroplating.

Please amend the paragraph below, on page 11, starting at line 17, as follows:

[0059] Fig. 8 shows a cross-sectional diagrammatical view of a further embodiment of the device comprises both a MEMS element and a thin film capacitor 50, as well as a vertical interconnect 60. This figure illustrates the advantageous feature of the invention, that the MEMS

element having electrodes 101, 111, 121 in the base layer 10, the intermediate layer 11 and the mechanical layer 12 can be embedded in a passive network that comprises other components as well, and without the need to apply any additional metal layer, or sacrificial layer. In fact, the first sacrificial layer 16 functions also as dielectric 301 of the thin-film capacitor 50. The electrodes 51,52 of the thin-film capacitor 50 are defined in the same metal layers as the second and the third electrode of the MEMS element 10. The third metal layer 12 is not only first electrode 121, but also interconnect. It is herein of particular importance for the first and second sacrificial layers 16,17 to be selectively etched away. The improvement is that not just one aperture in the mechanical layer 12 is present, but a plurality of apertures are, and that the supporting structure 300 has a substantial extension, i.e. it is primarily wall-shaped and not pillar-shaped.